DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a display, equips a detail with the lighting section which illuminates the display screen, and relates to the display which adjusts the brightness of the illumination light according to surrounding intensity.
[0002]
[Description of the Prior Art] Conventionally, as electronic equipment equipped with the display, a personal computer (Personal Computer), a paging receiver or PDA (Personal DigitalAssistant), etc. is known, for example. In the display in these electronic equipment, there are some which have adopted the liquid crystal display (it abbreviates to LCD:Liquid Crystal Display hereafter) for reasons with possible that the drive power of a display can be reduced, miniaturization of a display, and thin-shape-izing.
[0003] Also in electronic equipment equipped with such LCD, portability was high like especially a paging receiver and PDA, and lighting control as equipped with the light and back light for illuminating LCD in the electronic equipment which may have use on the outdoors, for example, shown below was performed.
[0004] Drawing 6 is the external view of the liquid crystal display as a conventional example. In this drawing, display window 2a which carries out opening to the top-face side of the body casing 2 is attended, and the liquid crystal display panel 3 is formed in the liquid crystal display 1. Moreover, opening of the extraneous light taking-in aperture 2b is carried out to the top-face side of the body casing 2 near the display window 2a. This extraneous light taking-in aperture 2b is an aperture for leading to light-receiving side 42a of the photosensor 42 which mentions the light (extraneous light) of the equipment exterior later, and fitting of the plastic hinged cover 4 of the shape of a transparent field is carried out.
[0005] Next, drawing 7 is a sectional view in the A-A line of the conventional liquid crystal display shown in drawing 6 . In this drawing, under the liquid crystal display panel 3, the back light (cathode-ray tube) 6 supported by supporter material (illustration abbreviation) is formed, and the reflecting plate 41 for irradiating efficiently the back light light from a back light 6 at the liquid crystal display panel 3 is further formed in the four way type and lower part. Moreover, the diffusion plate 5 for irradiating back light light on the liquid crystal display panel 3 at homogeneity sticks the periphery section to this liquid crystal display panel 3 by being supported by the reflecting plate 41, and is formed in the rear face of the liquid crystal display panel 3.
[0006] With a liquid crystal display 1, the back light light from a back light 6 is efficiently irradiated on the liquid crystal display panel 3 by considering as such structure at homogeneity.
[0007] On the other hand, under the extraneous light taking-in aperture 2b to which fitting of the plastic hinged cover 4 was carried out, PCB (printed circuit board)8 supported by supporter material (illustration abbreviation) is formed, and the photosensor 42 is being connected and fixed by soldering on this PCB8. This photosensor 42 equips that top face with light-receiving side 42a which receives light, and receives the extraneous light B inputted by this light-receiving side 42a through extraneous light taking-in aperture 2b.
[0008] Drawing 8 is drawing showing the sensibility property of this photosensor. In proportion to the brightness (illuminance) of the light (extraneous light B) which received light by light-receiving

side 42a of this photosensor 42 as a photosensor 42 was photoconductor (Photoconductor) and it was shown in drawing 8 , conductivity is high, namely, resistance becomes low.
[0009] In the sensibility property straight-line top which distinguishes the brightness around this equipment 1 based on resistance, for example, is shown in drawing 8 with the conventional liquid crystal display 1 using the above-mentioned property of a photosensor 42 When resistance is a value higher than a threshold (J point) (i.e., when the brightness around this equipment 1 is darker than predetermined level) The luminescence brightness of a back light (cathode-ray tube) 6 in low brightness Moreover, when resistance is a value lower than a threshold (J point), That is, when the brightness around this equipment 1 was brighter than predetermined level, as it said that the luminescence brightness of a back light 6 was controlled in high brightness, according to the brightness around this equipment 1, change control of the luminescence brightness of a back light 6 was carried out.
[0010]
[Problem(s) to be Solved by the Invention] However, in such a conventional display, there was a trouble as shown below in the situation that the illuminance of the extraneous light B which received light by light-receiving side 42a of a photosensor 42 is located near [threshold (J point)] on the sensibility property straight line shown in drawing 8 .
[0011] namely, the above-mentioned situation -- setting -- a slight change of an extraneous light B -- the luminescence brightness of a back light 6 -- the high brightness from low brightness -- or change control will be unstably carried out from high brightness to low brightness. Therefore, the phenomenon in which the luminescence brightness of a back light 6 changed frequently to the bottom of an environment, for example, the situations that a surrounding environment tends to change with migration, such as TV for mount, in which an extraneous light B carries out vertical-movement change slightly on both sides of a threshold (J point) occurred, and there was a trouble that the contents of a display of LCD were hard to see.
[0012] Moreover, there was also a trouble about the dependability of such a phenomenon bringing degradation of a back light 6 forward, or causing waste of an internal cell in the case of a pocket mold.
[0013] This invention is offering the display from which it is made in view of the above-mentioned contents, and the brightness of the illumination light does not change frequently by slight change of an extraneous light.
[0014]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 is characterized by to have a light-receiving means receive a lighting means illuminate the display screen, a light guide means draw the illumination light from this lighting means, and the light from the equipment outside and the illumination light drawn by said light guide means, and an adjustment means adjust the brightness of the illumination light of said lighting means based on the light-receiving result obtained by this light-receiving means.
[0015] Therefore, according to invention according to claim 1, it has a light guide means to lead the illumination light of a lighting means to a light-receiving means, the illumination light from said lighting means and the light from the equipment outside which were drawn by the light guide means concerned are received with said light-receiving means, and it is considering as the configuration which adjusts the brightness of the illumination light of said lighting means with an adjustment means based on this light-receiving result.
[0016] Therefore, by having considered as the configuration which readjusts the brightness of the illumination light with an extraneous light also in consideration of the brightness of the illumination light under the environment where the extraneous light concerned is irradiated, when adjusting the brightness of the illumination light Since a changed part of the adjusted illumination light concerned will be reflected also in the adjustment device in which the brightness of the illumination light is adjusted immediately once the brightness of the illumination light is adjusted the brightness of the illumination light by slight change of an extraneous light is frequent -- it can change, generating of a phenomenon can be prevented and the conspicuousness of a display can be improved. Moreover, since early degradation of a lighting means can be suppressed while being able to hold down waste of an internal cell by preventing generating of such a phenomenon, the dependability of a display can

also be improved.
[0017] Moreover, a lighting means by which invention according to claim 2 illuminates the display screen and a light-receiving means to receive the light from the equipment outside, A conversion means to change into an electrical-potential-difference value the light-receiving result obtained by this light-receiving means, A comparison means to compare the electrical-potential-difference value changed by this conversion means with the reference voltage level set up beforehand, Based on the comparison result obtained by this comparison means, it is characterized by having an adjustment means to adjust the brightness of the illumination light of said lighting means, and a reference voltage level adjustment means to adjust said reference voltage level set up beforehand based on the comparison result obtained by said comparison means.
[0018] Therefore, according to invention according to claim 2, it has a reference voltage level adjustment means to adjust a reference voltage level, the reference voltage level adjustment means concerned adjusts a reference voltage level based on the comparison result obtained by the comparison means, said comparison means compares the adjusted reference voltage level concerned and the electrical-potential-difference value according to a light-receiving result, and it is considering as the configuration which adjusts the brightness of the illumination light of a lighting means with an adjustment means based on this comparison result.
[0019] therefore, since fixed width of face can be given to the threshold for adjusting the brightness of the illumination light corresponding to change of an extraneous light, the brightness of the illumination light by slight change of an extraneous light is frequent -- it can change, generating of a phenomenon can be prevented and the conspicuousness of a display can be improved. Moreover, since early degradation of a lighting means can be suppressed while being able to hold down waste of an internal cell by preventing generating of such a phenomenon, the dependability of a display can also be improved.
[0020]
[Embodiment of the Invention] Hereafter, with reference to a drawing, the gestalt of the suitable operation for this invention is explained to a detail.
(Gestalt of the 1st operation) Drawing 1 - drawing 3 are drawings showing the 1st example of the gestalt of operation of the liquid crystal display which applied the display of this invention.
[0021] In the liquid crystal display 1 in the gestalt of this operation, change control of the luminescence brightness of the back light (cathode-ray tube) 6 which illuminates the liquid crystal display panel 3 from a background is carried out in two steps, low brightness and high brightness, according to the brightness around this equipment 1.
[0022] First, a configuration is explained. Since the appearance of the liquid crystal display 1 which applied this invention is the same as the conventional liquid crystal display shown in drawing 6 , explanation is omitted. Next, the structure of the light sensing portion of a liquid crystal display 1 is explained in full detail. Drawing 1 is a sectional view in the A-A line of the liquid crystal display (refer to drawing 6) which applied this invention.
[0023] In this drawing, under the liquid crystal display panel 3, the back light (cathode-ray tube) 6 supported by supporter material (illustration abbreviation) is formed, and the reflecting plate 7 for irradiating efficiently the back light light from a back light 6 at the liquid crystal display panel 3 is further formed in the four way type and lower part. Light guide hole 7a is prepared in the flank of this reflecting plate 7, and the back light light C is led to light-receiving side 9a of a photosensor 9 through this light guide hole 7a. Moreover, the diffusion plate 5 sticks to this liquid crystal display panel 3, and is formed in the rear face of the liquid crystal display panel 3.
[0024] On the other hand, under the extraneous light taking-in aperture 2b to which fitting of the plastic hinged cover 4 was carried out, PCB (printed circuit board)8 supported by supporter material (illustration abbreviation) is formed, and the photosensor 9 is being connected and fixed by soldering on this PCB8. This photosensor 9 equips that top face with light-receiving side 9a which receives light, and as shown in drawing 1 , it is installed on PCB8 in the posture toward which this light-receiving side 9a inclined in the light guide hole 7a side only in the predetermined include angle.
[0025] Thus, in a liquid crystal display 1, when light guide hole 7a was prepared in the flank of a reflecting plate 7 and only the predetermined include angle made light-receiving side 9a of a photosensor 9 incline in this light guide hole 7a side, it becomes possible to receive the back light

light C inputted through the extraneous light B and light guide hole 7a which are inputted through extraneous light taking-in aperture 2b by light-receiving side 9a of this photosensor 9.
[0026] Then, the back light modulated light control circuit 10 of a liquid crystal display 1 is explained in full detail. Drawing 2 is drawing showing the back light modulated light control circuit of the liquid crystal display of drawing 1 . In this drawing, the back light modulated light control circuit 10 is constituted by the light sensing portion 11, the comparator 12, the control section 13, and the light-emitting part 14.
[0027] A light sensing portion 11 consists of a photosensor 9 and resistance 21. In proportion to the brightness (illuminance) of the light (an extraneous light B and back light light C) which a photosensor 9 is photoconductor and received light by light-receiving side 9a of this photosensor 9, conductivity is high, namely, resistance becomes low. Reference voltage is impressed to this photosensor 9 from the electrical-potential-difference supply terminal 22 of a comparator 12 through resistance 21. This outputs the electrical-potential-difference value (refer to drawing 3) according to the light-receiving illuminance obtained by the photosensor 9 to the minus side input terminal of a comparator 25 in a light sensing portion 11.
[0028] A comparator 12 consists of the electrical-potential-difference supply terminal 22, resistance 23, resistance 24, and a comparator 25. Reference voltage is impressed to the electrical-potential-difference supply terminal 22 from the voltage source which is not illustrated. Reference voltage is impressed to resistance 23 and resistance 24 from the electrical-potential-difference supply terminal 22, and, thereby, the predetermined electrical-potential-difference value the partial pressure was carried out [the value] by this resistance 23 and resistance 24 is inputted into the plus side input terminal of a comparator 25. This predetermined electrical-potential-difference value is a threshold for carrying out change control of the luminescence brightness of a back light 6 at low brightness or high brightness.
[0029] The electrical-potential-difference value according to the light-receiving illuminance obtained by the photosensor 9 by which a comparator 25 is inputted into a minus side input terminal, Perform the comparison with the threshold inputted into a plus side input terminal, and when it is a value with the electrical-potential-difference value higher than a threshold according to a light-receiving illuminance It outputs to a control section 13 by making a negative predetermined electrical-potential-difference value into a detecting signal, and when the electrical-potential-difference value according to a light-receiving illuminance is a value lower than a threshold, it outputs to a control section 13 by making a forward predetermined electrical-potential-difference value into a detecting signal.
[0030] A control section 13 is based on a detecting signal from a comparator 25, and when this detecting signal is a negative predetermined electrical-potential-difference value (i.e., when the brightness around this equipment 1 is darker than predetermined level) When this detecting signal is a forward predetermined electrical-potential-difference value again about the control signal of the purport which carries out low brightness luminescence of the back light 6 (i.e., when the brightness around this equipment 1 is brighter than predetermined level), the control signal of the purport which carries out high brightness luminescence of the back light 6 is outputted to the inverter transformer 26.
[0031] A light-emitting part 14 consists of the inverter transformer 26, a capacitor 27, and a back light 6. The inverter transformer 26 generates the high-frequency power for making a back light 6 emit light by low brightness or high brightness based on the control signal from a control section 13, and supplies it to a back light 6 through a capacitor 27. A back light 6 emits light with two steps of brightness, low brightness or high brightness, based on the high-frequency power supplied from the inverter transformer 26 through a capacitor 27.
[0032] Next, the back light modulated light control in a liquid crystal display 1 is explained in full detail. Drawing 3 is drawing showing the relation between the brightness (illuminance) around this equipment 1 including the light B which received light in respect of light-receiving of a photosensor, i.e., an extraneous light, and the back light light C, and the electrical-potential-difference value impressed to the minus side input terminal of the comparator of the back light modulated light control circuit shown in drawing 2 .
[0033] As shown in this drawing, in the liquid crystal display 1 in the gestalt of this operation The

brightness around this equipment 1 (illuminance) is distinguished based on the electrical-potential-difference value by which the minus side input terminal of a comparator 25 is impressed. On a property straight line, when it is a value with said electrical-potential-difference value higher than a threshold (D point) (i.e., when the brightness around this equipment 1 is darker than predetermined level) When said electrical-potential-difference value is a value lower than a threshold (D point) about the luminescence brightness of a back light 6 again at low brightness (i.e., when the brightness around this equipment 1 is brighter than predetermined level), change control of the luminescence brightness of a back light 6 is carried out at high brightness.

[0034] If here explains in more detail about the condition in the threshold (D point) neighborhood on a property straight line, when the brightness around this equipment 1 changes from dark to ** gradually, the electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 passes E points, and approaches the threshold (D point) gradually. And if said electrical-potential-difference value exceeds a threshold (D point), the detecting signal outputted from a comparator 25 will change to a forward predetermined electrical-potential-difference value, and the luminescence brightness of a back light 6 will change from low brightness to high brightness based on this.

[0035] Since the photosensor 9 is considered as the configuration which receives the back light light C with an extraneous light B in drawing 1 and drawing 2 If the luminescence brightness of a back light 6 changes from low brightness to high brightness, the electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 It moves to F points lower a changed part from low brightness to the high brightness of the luminescence brightness of the back light light C received with this photosensor 9 through light guide hole 7a than a threshold (D point) in an instant, and new fluctuation is started according to the brightness around this equipment 1 from the F points concerned.

[0036] Moreover, it is also conversely the same as when the brightness around this equipment 1 changes from ** gradually tacitly, and the electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 passes F points, and approaches the threshold (D point) gradually. And if said electrical-potential-difference value exceeds a threshold (D point), the detecting signal outputted from a comparator 25 will change to a negative predetermined electrical-potential-difference value, and the luminescence brightness of a back light 6 will change from high brightness to low brightness based on this.

[0037] Since the photosensor 9 is considered as the configuration which receives the back light light C with an extraneous light B in drawing 1 and drawing 2 If the luminescence brightness of a back light 6 changes from high brightness to low brightness, the electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 It moves to E points higher a changed part from high brightness to the low brightness of the luminescence brightness of the back light light C received with this photosensor 9 through light guide hole 7a than a threshold (D point) in an instant, and new fluctuation is started according to the brightness around this equipment 1 from the E points concerned.

[0038] therefore, the luminescence brightness of the back light 6 by slight change of an extraneous light B is frequent -- it changes and generating of a phenomenon can be prevented.

[0039] Triggered by the above mentioned, with the liquid crystal display 1 in the gestalt of this operation When light guide hole 7a was prepared in the flank of a reflecting plate 7 and only the predetermined include angle made light-receiving side 9a of a photosensor 9 incline in this light guide hole 7a side The back light light C from a back light 6 and the extraneous light B from the equipment outside are received by light-receiving side 9a of this photosensor 9, and the luminescence brightness of a back light 6 is changed to low brightness or high brightness by the control section 13 based on this light-receiving result.

[0040] Therefore, by having considered the luminescence brightness as the configuration which carries out change control also in consideration of the brightness of the back light light C under the environment where the extraneous light B concerned is irradiated with the extraneous light B, when carrying out change control of the luminescence brightness of a back light 6 Since a changed part of the back light light C in that case will be reflected also in the change controlling mechanism which changes the luminescence brightness of the back light light C immediately once the luminescence

brightness of a back light 6 is changed the luminescence brightness of the back light 6 by slight change of an extraneous light B is frequent -- it changes and generating of a phenomenon can be prevented. Moreover, while being able to hold down waste of a dc-battery by preventing generating of such a phenomenon, early degradation of a back light 6 can be suppressed. The above is explanation about the 1st example of the gestalt of operation.

[0041] In addition, although that property moves from a threshold (D point) to E points or F points in an instant when the luminescence brightness of a back light 6 changes on the property straight line shown in drawing 3 , the migration width of face at this time can be set as the magnitude of arbitration by whenever [aperture / of light guide hole 7a prepared in the flank of a reflecting plate 7 /, and tilt-angle / of light-receiving side 9a of a photosensor 9] etc.

[0042] Moreover, a light guide means may not be limited to the structure where prepared light guide hole 7a in the flank of a reflecting plate 7, and only the predetermined include angle made light-receiving side 9a of a photosensor 9 incline in this light guide hole 7a side, and in short, as long as it is a means to lead the back light light C (illumination light) from a back light 6 (lighting means) to light-receiving side 9a (light-receiving means) of a photosensor 9, it may be what kind of thing.

[0043] (Gestalt of the 2nd operation) Next, drawing 4 and drawing 5 are drawings showing the 2nd example of the gestalt of operation of the liquid crystal display which applied the display of this invention. First, a configuration is explained.

[0044] In the liquid crystal display 30 in the gestalt of this operation, change control of the luminescence brightness of the back light 6 which illuminates the liquid crystal display panel 3 from a background is carried out like the liquid crystal display 1 in the gestalt of implementation of the above 1st in two steps, low brightness and high brightness, according to the brightness around this equipment 30.

[0045] Since the appearance of the liquid crystal display 30 which applied this invention is the same as the conventional liquid crystal display shown in drawing 6 and the sectional view in the A-A line of this liquid crystal display 30 is the same as the sectional view of the conventional liquid crystal display shown in drawing 7 , explanation is omitted.

[0046] Then, the back light modulated light control circuit 31 of a liquid crystal display 30 is explained in full detail. In addition, the back light modulated light control circuit 31 of the back light modulated light control circuit 10 (refer to drawing 2) shown in the gestalt of implementation of the above 1st and a fundamental configuration is the same, and since a configuration differs only from a comparator 12 in this circuit 10 shown in this drawing 2 as for a light sensing portion 11, it shall illustrate only this different part. Drawing 4 is drawing showing the light sensing portion and comparator of a back light modulated light control circuit of a liquid crystal display in the gestalt of this operation. In addition, in this drawing, the same number shall be given to the same component as the light sensing portion 11 and comparator 12 in the gestalt of implementation of the above 1st.

[0047] A light sensing portion 32 consists of a photosensor 9 and resistance 21. In proportion to the brightness (illuminance) of the light (extraneous light B) which a photosensor 9 is photoconductor and received light by light-receiving side 9a of this photosensor 9, conductivity is high, namely, resistance becomes low. Reference voltage is impressed to this photosensor 9 from the electrical-potential-difference supply terminal 22 of a comparator 33 through resistance 21. This outputs the electrical-potential-difference value (refer to drawing 5) according to the light-receiving illuminance obtained by the photosensor 9 to the minus side input terminal of a comparator 25 in a light sensing portion 32.

[0048] A comparator 33 consists of the electrical-potential-difference supply terminal 22, resistance 23, resistance 24, a comparator 25, and resistance 34. Reference voltage is impressed to the electrical-potential-difference supply terminal 22 from the voltage source which is not illustrated, and the predetermined electrical-potential-difference value the partial pressure was carried out [the value] by resistance 23 and resistance 24 is inputted into the plus side input terminal of a comparator 25. This predetermined electrical-potential-difference value is a temporary threshold for carrying out change control of the luminescence brightness of a back light 6 at low brightness or high brightness.

[0049] The electrical-potential-difference value according to the light-receiving illuminance obtained by the photosensor 9 by which a comparator 25 is inputted into a minus side input terminal, Perform the comparison with the predetermined electrical-potential-difference value inputted into a plus side

input terminal, and when it is a value with the electrical-potential-difference value higher than a predetermined electrical-potential-difference value according to a light-receiving illuminance It outputs to a control section 13 by making a negative predetermined electrical-potential-difference value into a detecting signal, and when the electrical-potential-difference value according to a light-receiving illuminance is a value lower than a predetermined electrical-potential-difference value, it outputs to a control section 13 by making a forward predetermined electrical-potential-difference value into a detecting signal.

[0050] Moreover, an electrical-potential-difference value negative [which is outputted from a comparator 25 / predetermined] or forward returns to the plus side input terminal of a comparator 25 through resistance 34. Therefore, the predetermined electrical-potential-difference value inputted into the plus side input terminal of a comparator 25 is adjusted to a new predetermined electrical-potential-difference value by an electrical-potential-difference value negative [which is outputted from this comparator 25 / predetermined], or forward, and resistance 34.

[0051] Next, back light modulated light control of the liquid crystal display 30 in the gestalt of this operation is explained in full detail. Drawing 5 is drawing showing the relation between the brightness (illuminance) of the light B which received light in respect of light-receiving of a photosensor, i.e., an extraneous light, and the electrical-potential-difference value impressed to the minus side input terminal of the comparator of a comparator shown in drawing 4 .

[0052] As shown in this drawing, in the liquid crystal display 30 in the gestalt of this operation The brightness around this equipment 30 (illuminance) is distinguished based on the electrical-potential-difference value by which the minus side input terminal of a comparator 25 is impressed. When it is a value higher than the predetermined electrical-potential-difference value (the 1st threshold: H points) adjusted with the feedback electrical-potential-difference value from a comparator 25 on the property straight line, Namely, when the brightness around this equipment 30 is darker than the 1st predetermined level The luminescence brightness of a back light 6 in low brightness Moreover, when it is a value lower than the predetermined electrical-potential-difference value (the 2nd threshold: I points) adjusted with the feedback electrical-potential-difference value from a comparator 25, That is, when the brightness around this equipment 30 is brighter than the 2nd predetermined level, change control of the luminescence brightness of a back light 6 is carried out at high brightness.

[0053] Outputting an electrical-potential-difference value negative [predetermined] in a comparator 25 as a detecting signal, if it is a value higher than a threshold (G points) with the temporary electrical-potential-difference value first impressed to the minus side input terminal of a comparator 25 when the brightness around this equipment 30 changes to ** gradually from dark, if it explains in more detail, an electrical-potential-difference value negative [this] returns to the plus side input terminal of a comparator 25 through resistance 34. The temporary threshold (G points) inputted into the plus side input terminal of a comparator 25 by this is adjusted to this 2nd threshold (I points) lower than G points.

[0054] The electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 passes H points and G points, and approaches I points as the brightness around this equipment 30 changes from dark to ** gradually. And if said electrical-potential-difference value exceeds I points, i.e., said 2nd threshold, the detecting signal outputted from a comparator 25 will change from a negative predetermined electrical-potential-difference value to a forward predetermined electrical-potential-difference value, and the luminescence brightness of a back light 6 will change from low brightness to high brightness based on this.

[0055] Moreover, the forward predetermined electrical-potential-difference value outputted from the comparator 25 returns to the plus side input terminal of a comparator 25 through resistance 34 in this case. The 2nd threshold (I points) inputted into the plus side input terminal of a comparator 25 by this until now is readjusted to the 1st threshold (H points) higher than a temporary threshold (G points).

[0056] Outputting an electrical-potential-difference value forward [predetermined] in a comparator 25 as a detecting signal, if it is a value lower than a threshold (G points) with the temporary electrical-potential-difference value which is also the same as when the brightness around this equipment 30 changes from ** gradually tacitly conversely on the other hand, and is first impressed

to the minus side input terminal of a comparator 25, an electrical-potential-difference value forward [this] returns to the plus side input terminal of a comparator 25 through resistance 34. The temporary threshold (G points) inputted into the plus side input terminal of a comparator 25 by this is adjusted to this 1st threshold (H points) higher than G points.

[0057] The electrical-potential-difference value impressed to the minus side input terminal of a comparator 25 passes I points and G points, and approaches H points as the brightness around this equipment 30 changes from ** gradually tacitly. And if said electrical-potential-difference value exceeds H points, i.e., said 1st threshold, the detecting signal outputted from a comparator 25 will change from a forward predetermined electrical-potential-difference value to a negative predetermined electrical-potential-difference value, and the luminescence brightness of a back light 6 will change from high brightness to low brightness based on this.

[0058] Moreover, the negative predetermined electrical-potential-difference value outputted from the comparator 25 returns to the plus side input terminal of a comparator 25 through resistance 34 in this case. The 1st threshold (H points) inputted into the plus side input terminal of a comparator 25 by this until now is readjusted to the 2nd threshold (I points) lower than a temporary threshold (G points).

[0059] therefore, the luminescence brightness of the back light 6 by slight change of an extraneous light B is frequent -- it changes and generating of a phenomenon can be prevented.

[0060] Triggered by the above mentioned, with the liquid crystal display 30 in the gestalt of this operation The detecting signal (electrical-potential-difference value negative [predetermined] or forward) outputted from a comparator 25 is returned to the plus side input terminal of this comparator 25. It considers as the circuitry which readjusts the temporary threshold (G points) set up first. When it is distinguished by the comparator 25 that it is a value with the electrical-potential-difference value higher than a temporary threshold (G points) according to the first light-receiving result The temporary threshold (G points) concerned is adjusted to the 2nd lower threshold (I points). Moreover, when it is distinguished by the comparator 25 that it is a value with the electrical-potential-difference value lower than a temporary threshold (G points) according to the first light-receiving result Adjust the temporary threshold (G points) concerned to the 1st higher threshold (H points), and a comparator 25 compares the 1st or 2nd adjusted threshold concerned and the electrical-potential-difference value according to a light-receiving result. Based on this comparison result, the luminescence brightness of a back light 6 is changed to low brightness or high brightness by the control section 13.

[0061] therefore, since fixed width of face can be given to the threshold for carrying out change control of the luminescence brightness of a back light 6 corresponding to change of an extraneous light B, the luminescence brightness of the back light 6 by slight change of an extraneous light B is frequent -- it changes and generating of a phenomenon can be prevented. Moreover, while being able to hold down waste of a dc-battery by preventing generating of such a phenomenon, early degradation of a back light 6 can be suppressed.

[0062] As mentioned above, although this invention was concretely explained based on the gestalt of the 1st and the 2nd operation, as for this invention, it is needless to say for it to be able to change suitably in the range which is not limited to the example of a gestalt of the above-mentioned implementation, and does not deviate from the summary.

[0063] For example, although the luminescence brightness of a back light 6 was considered as the configuration which carries out change control in the example of a gestalt of the above 1st and the 2nd implementation in two steps, low brightness and high brightness, according to the brightness of the perimeter of equipment, if the luminescence brightness of the back light 6 which carries out change control is not limited to two steps, and is equipped with two or more comparators and it enables it to set up two or more steps of thresholds, it is possible also in carrying out change adjustment in luminescence brightness to a multistage story.

[0064] Moreover, although the back light 6 which illuminates the liquid crystal display panel 3 from a background was made into the lighting means in the example of a gestalt of the above 1st and the 2nd implementation, a lighting means may not be limited to said back light 6, and as long as it is a means to illuminate the display screen, in short, it may be what kind of thing.

[0065]

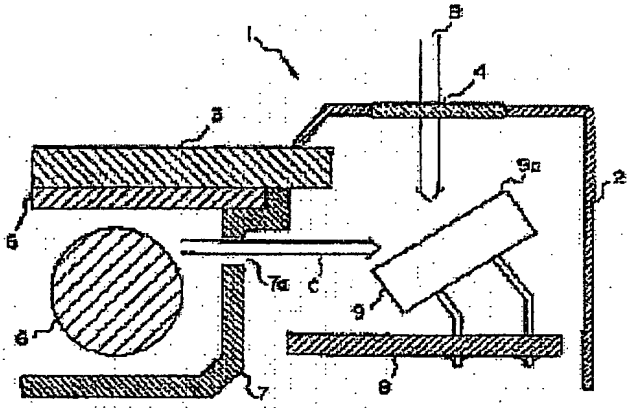
[Effect of the Invention] By having considered as the configuration which readjusts the brightness of the illumination light with an extraneous light also in consideration of the brightness of the illumination light under the environment where the extraneous light concerned is irradiated, when adjusting the brightness of the illumination light according to invention according to claim 1 Since a changed part of the adjusted illumination light concerned will be reflected also in the adjustment device in which the brightness of the illumination light is adjusted immediately once the brightness of the illumination light is adjusted the brightness of the illumination light by slight change of an extraneous light is frequent -- it can change, generating of a phenomenon can be prevented and the conspicuousness of a display can be improved. Moreover, since early degradation of a lighting means can be suppressed while being able to hold down waste of an internal cell by preventing generating of such a phenomenon, the dependability of a display can also be improved.
[0066] moreover, since fixed width of face can be given to the threshold for adjusting the brightness of the illumination light corresponding to change of an extraneous light according to invention according to claim 2, the brightness of the illumination light by slight change of an extraneous light is frequent -- it can change, generating of a phenomenon can be prevented and the conspicuousness of a display can be improved. Moreover, since early degradation of a lighting means can be suppressed while being able to hold down waste of an internal cell by preventing generating of such a phenomenon, the dependability of a display can also be improved.

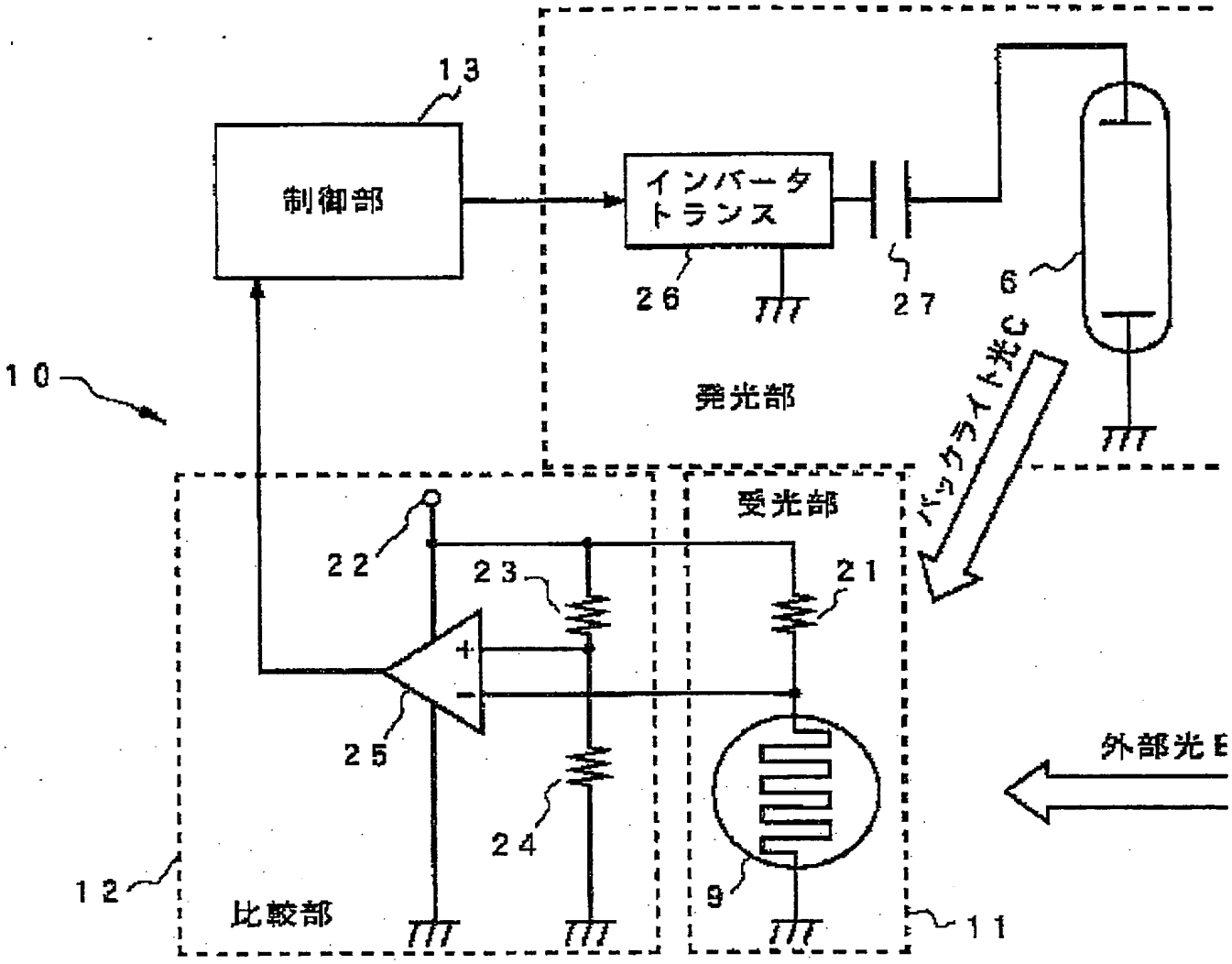
[Translation done.]

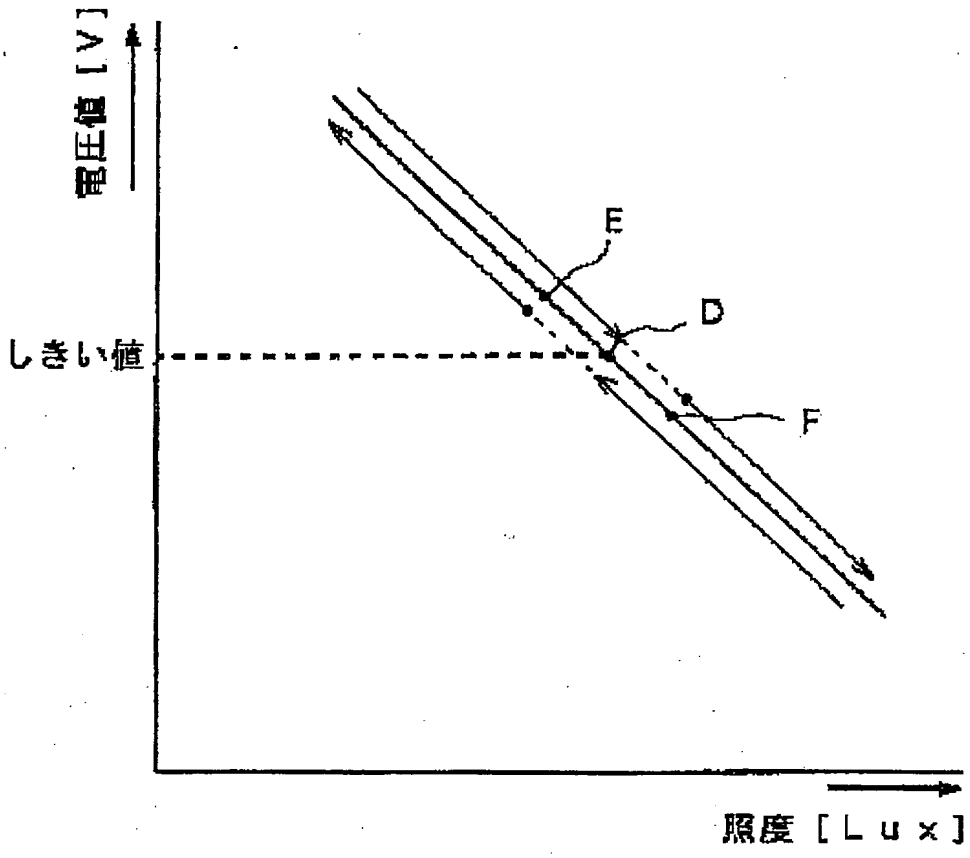
CLAIMS

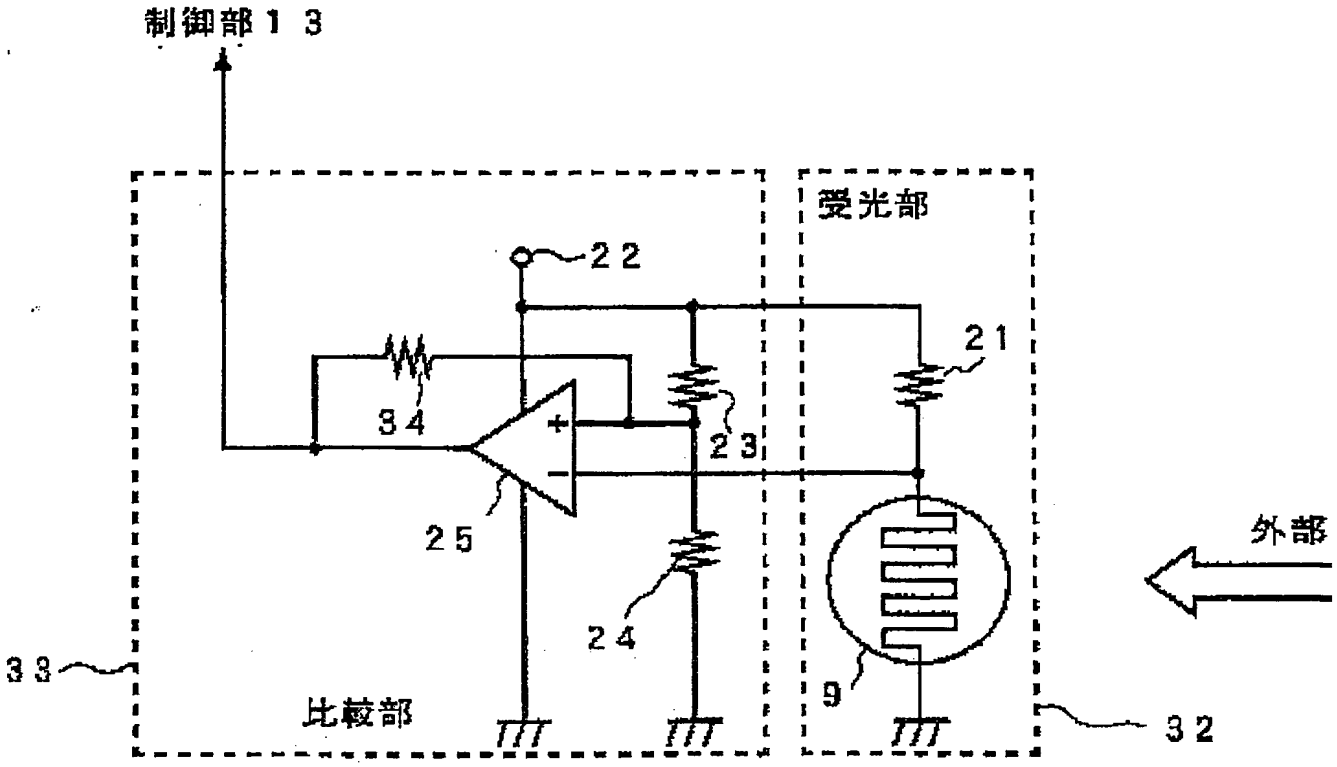
[Claim(s)]
[Claim 1] The display characterized by to have a light-receiving means receive a lighting means to illuminate the display screen, a light guide means to draw the illumination light from this lighting means, and the light from the equipment outside and the illumination light drawn by said light guide means, and an adjustment means adjust the brightness of the illumination light of said lighting means based on the light-receiving result obtained by this light-receiving means.
[Claim 2] A lighting means to illuminate the display screen, and a light-receiving means to receive the light from the equipment outside, A conversion means to change into an electrical-potential-difference value the light-receiving result obtained by this light-receiving means, A comparison means to compare the electrical-potential-difference value changed by this conversion means with the reference voltage level set up beforehand, The display characterized by having an adjustment means to adjust the brightness of the illumination light of said lighting means, and a reference voltage level adjustment means to adjust said reference voltage level set up beforehand based on the comparison result obtained by said comparison means, based on the comparison result obtained by this comparison means.

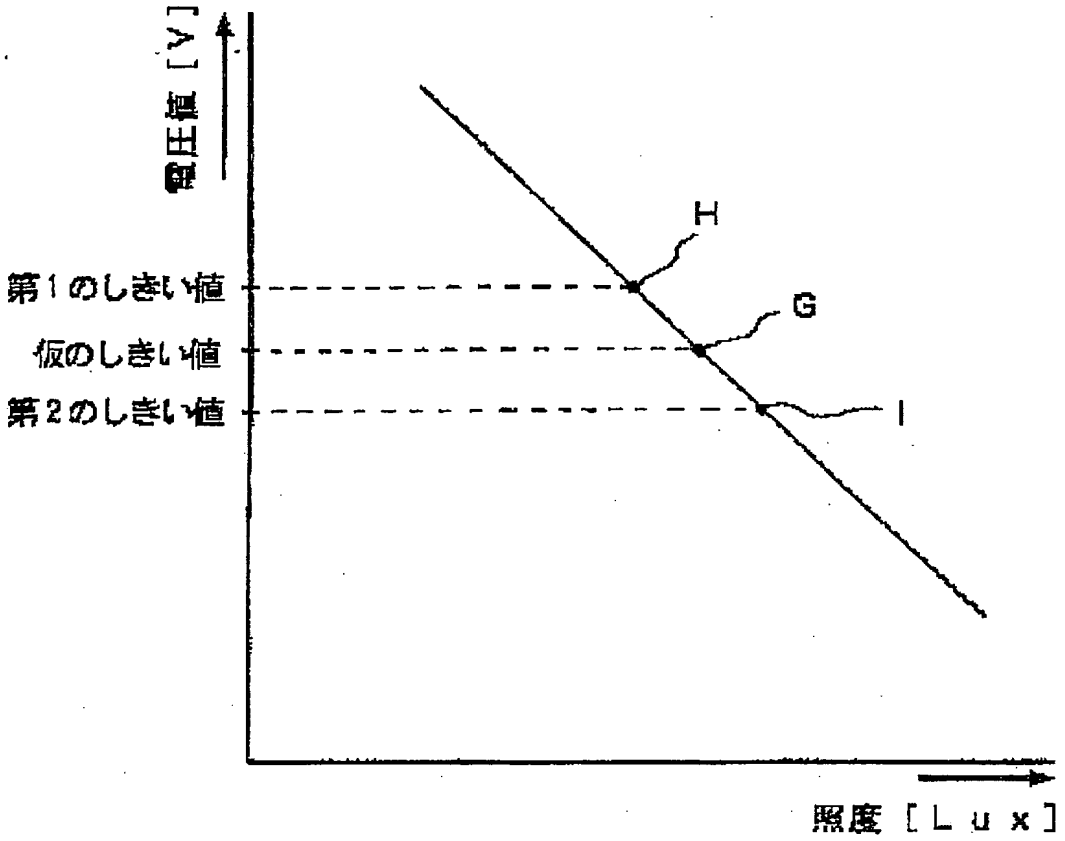
[Translation done.]

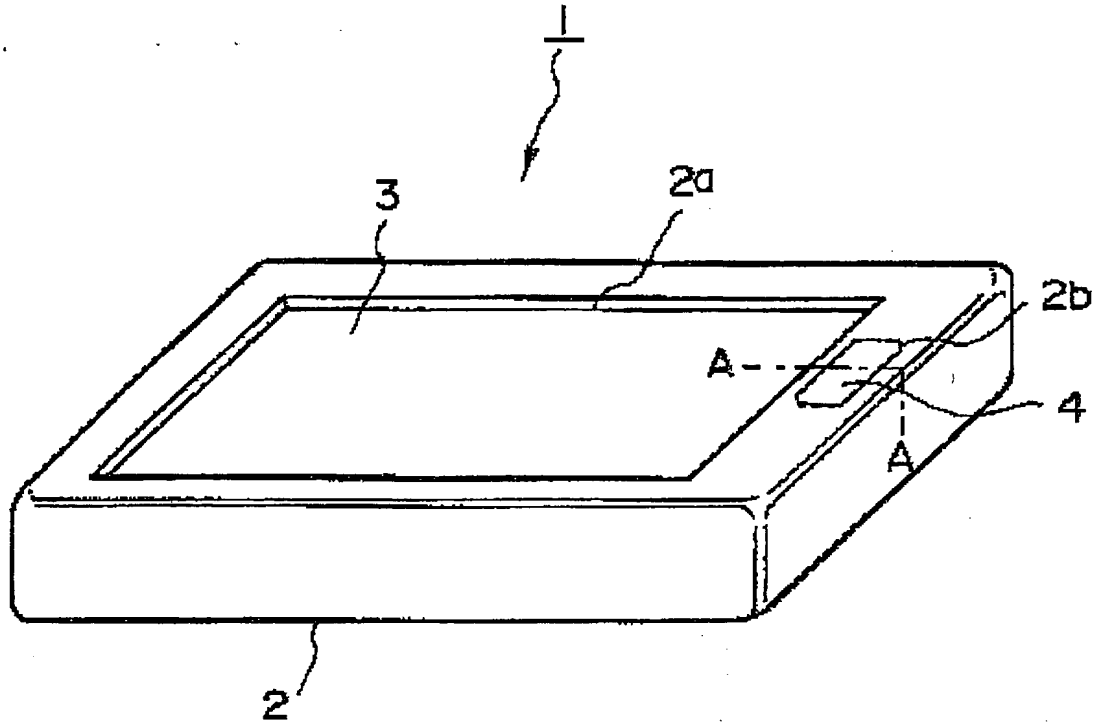

1
B
4
3
9a
2
5
7a
C
9
6
7
8

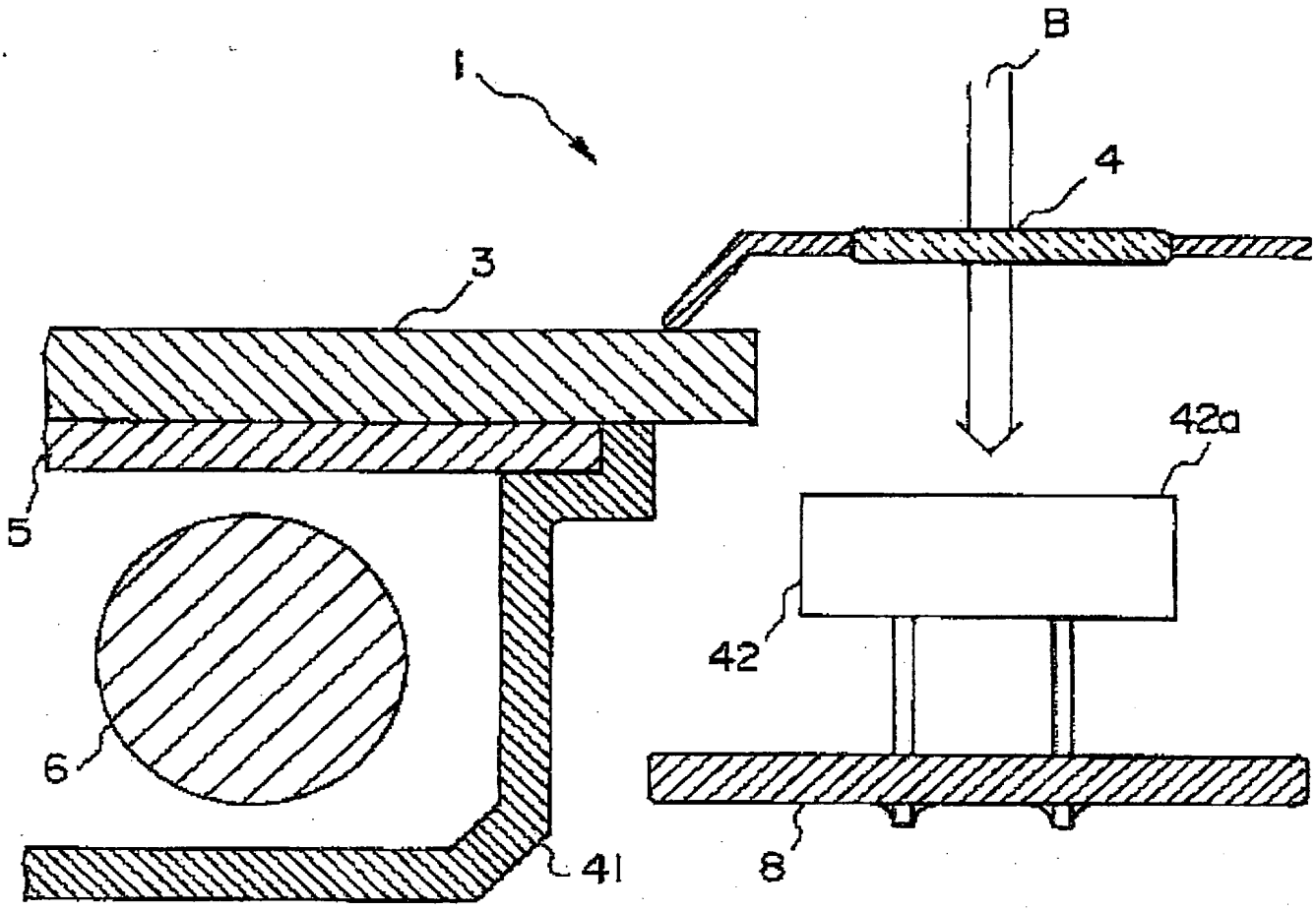

13
制御部
インバータ
トランス
26
27
6
10
発光部
バックライト光C
受光部
22
23
21
25
24
外部光E
12
比較部
9
11


電圧値［V］
しきい値
E
D
F
照度［Lux］


制御部１３
受光部
２２
２１
３４
２３
２５
２４
外部
３３
９
比較部
３２


電圧値［V］
H
第1のしきい値
G
仮のしきい値
第2のしきい値
I
照度［Lux］


1
3
2a
2b
A
A
4
2


1
B
4
3
42a
5
42
6
41
8

光センサの感度特性